

SOME NOTES ON THE TERMITES (ISOPTERA) OF BARROW ISLAND AND A CHECK LIST OF SPECIES

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I paid a visit to Barrow Island during the period March 29 to April 5, 1971. The main reason for this visit was to determine if the genus *Drepanotermes* was represented on the island and if so to collect and describe any species present for a revision of the genus in preparation by J. A. L. Watson and myself. The opportunity was also taken to collect as thoroughly as possible, in the time available, any other species of termite that might be located.

TERMITE DISTRIBUTION

W. H. Butler in his "Summary of the Vertebrate Fauna of Barrow Island", *W. Aust. Nat.*, 11 (7), divides the island into six natural zones as follows:—Zone 1. The Fore Dunes. Zone 2. The Red Sand Dunes. Zone 3. Limestone Ridges. Zone 4. Clay Pans. Zone 5. Creek Beds. Zone 6. Mangrove Thickets.

Zone 1 appears to be unattractive to termites and whilst not searched exhaustively, none were located. Zones 2 and 3 are favoured environments for a wide range of species. It was not possible to search thoroughly Zones 4 and 5 due to flooding and water logging. Several species were located on the higher and drier parts and as flooding for periods of several weeks is known to have little effect on termites inhabiting such environments it can be assumed that termites occur on the lower areas also. Zone 6 yielded a single species from each of three genera. These were all wood-eating termites and were taken from mangrove logs lying above high water.

The wood-eating termites occur in all zones where wood is available to them. The harvester termites appear to live almost exclusively on grasses on Barrow Island, although certain species, particularly *Drepanotermes* spp., harvest other organic debris on the mainland. The termites utilising decayed organic material for food occur in all zones where this is available to them.

Food, however, is not the only factor governing the distribution of species on the island, and this is clearly demonstrated by checking the occurrence of colonies of *Nasutitermes triodae*. This termite occurs right across the north of Australia and is well known as a builder of massive mound structures, a habit which makes it easy to locate the colonies. This species is confined to Zones 2 and 3 on Barrow Island but there are large areas within these two zones in which it cannot be found at all. Some unknown factor, other than the presence of suitable food and mound building material, influences distribution.

THE EFFECT OF FIRE ON THE FOOD SUPPLY AND SURVIVAL OF HARVESTER TERMITES

An interesting example of the effect on the survival of harvester termites, following the destruction of their food supply by fire, was noted. *Triodia angusta* is a climax plant and covers quite extensive areas within Zone 2. On this particular site near oil well B14, it had been completely destroyed by fire in August, 1969 and was re-establishing itself slowly from seed remaining in the soil after the burn, or blown on to it from surrounding unburnt country. In April, 1971 a good cover of small woody perennials had established themselves on the burnt area. However only a few small and scattered tussocks of *Triodia angusta* were to be seen. The difference in appearance of the burnt and unburnt areas was striking and an excellent illustration of pioneer species regenerating after the burn. Adjoining in the unburnt climax *Triodia angusta* association, most of the pioneer species had matured and disappeared. The dramatic change wrought by the fire had caused the harvester termite population to crash and none could be located in the time available to me. Mr. H.

Suijddorp, an officer of the Department of Agriculture, who has had extensive experience in the management of spinifex country for grazing, informed me that summer fires will kill out spinifex tussocks but that burning in the cooler part of the year does not have this effect. Despite the fact that this fire occurred in August, 1969 it is interesting to note that under these conditions *Triodia angusta* has failed to regenerate from root stocks. When spinifex can regenerate rapidly from root stocks after a burn, harvester termites are able to survive on their stocks of stored grass until new supplies are available to them. The slower re-establishment of spinifex from seed does not permit this.

SOME NOTES ON HARVESTER TERMITES

The harvesting and storing of grasses and other organic debris is confined to certain species of *Drepanotermes*, *Tumulitermes*, *Nasutitermes*, *Amitermes* and *Schedorhinotermes*. *Schedorhinotermes* is a recent addition to this list and was collected on Barrow Island where it was harvesting spinifex and storing it in underground chambers. This proved to be *Schedorhinotermes derosus*. This termite occurs in the Kimberleys where it has been recorded as a harvester of grasses (J. A. L. Watson, 1969). All other species of *Schedorhinotermes* are exclusively sound wood eaters and have proved to be very destructive to fences and buildings in the arid and semi-arid regions of this State.

There was no harvesting activity by termites during the period I was on the island, probably due to the very heavy soaking rains which had been received. There had been considerable activity in this direction prior to my visit and food storage chambers were well stocked with chaffed grasses. However following the rains all underground storages were deteriorating rapidly and much of it was riddled with fungal hyphae. The above-ground storages in mounds did not show this deterioration.

The harvesting or foraging activity of the harvester termites is very interesting to observe. Operations are commenced by the workers opening up one or more access tunnels to the surface, usually on warm, damp and windless evenings and nights, but sometimes during the day following light rain. The foraging workers emerge and keeping in a fairly compact group, immediately commence to gather dry grass or other organic debris and transport it underground. Small pieces easily handled by a single worker are carried but larger pieces are dragged. Several workers will unite to drag large pieces too heavy for a single worker to transport. Once below the surface the foraged material is cut into small easily moved pieces and stored in chambers excavated for the purpose or transported along runways to the mound, if the species is a mound builder. The workers are protected from predators whilst on the surface by the soldier caste, numbers of which emerge with the workers and patrol around the perimeter of the party. Ants have been observed to attack a foraging party but far more often than not they approach within a few inches of the group, wave their antennae at the defending soldier termites, and then retreat. If attacked by predators or even an inquisitive naturalist with a pair of tweezers, an alarm signal is instantly given by the victim and the entire party immediately ceases all harvesting activity, drops anything being carried and begins to stream into the access vents. The soldiers usually patrol the shrinking perimeter of the party and as the workers retreat they close in and are the last to leave the surface. Such an interrupted operation will not be resumed on that night. I have observed this foraging operation on a number of occasions and although crouched right over the busy termites, the better to see what is going on, they take absolutely no notice of my presence. As soon as a single worker is picked up however, the whole party instantly commences to return underground. Once such a retreat is commenced I have never seen it to be halted or reversed. The whole party returns underground and the exit holes are sealed by the workers who are protected by a circle of soldiers whose heads and fighting mandibles fill the opening until it is closed.

The mating flights of the alates or winged reproductives is an occasion for a feast for birds, reptiles, other insects such as dragon flies, frogs and spiders. Countless millions of these alates, representing many species, make this flight once a year, but very few survive the dangers and hazards of predators and unfavourable weather conditions to establish a new colony. Such flights can often be located by watching bird activity. On Barrow Island such a flight occurred on a warm, humid and almost windless afternoon and attention was drawn to it by the activity of a large flock of Silver Gulls *Larus novae-hollandae* which were obviously feeding on the wing on flying insects. The victims proved to be a beautiful golden coloured form of the alates of the harvester termite *Drepanotermes rubriceps*.

Collections made on the island during my visit comprise 52 series, representing 7 genera and 25 species and are listed in the accompanying table. One or more series of each species will be deposited with the National Insect Collection in Canberra and the balance retained in my own collection.

LIST OF TERMITES COLLECTED ON BARROW ISLAND

Name	No of Series Collected	Castes Collected	Food
<i>Drepanotermes rubriceps</i>	6	Workers, soldiers and alates	Grass
<i>Drepanotermes sp. nov.</i>	1	Workers and soldiers	Grass
<i>Drepanotermes sp. nov.</i>	2	Workers and soldiers	Grass
<i>Drepanotermes sp. nov.</i>	6	Workers and soldiers	Grass
<i>Amitermes innoxius</i>	4	Workers and soldiers	Decayed organic material
<i>Amitermes abruptus</i>	3	Workers and soldiers	"
<i>Amitermes accinctus</i>	2	Workers and soldiers	"
<i>Amitermes pandus</i>	1	Workers and soldiers	"
<i>Amitermes inops</i>	1	Workers and soldiers	"
<i>Amitermes darwini</i>	3	Workers and soldiers	"
<i>Amitermes hartmeyeri</i>	1	Workers and soldiers	"
<i>Amitermes sp. nov.</i>	1	Workers and soldiers	"
<i>Amitermes sp. nov.</i>	2	Workers and soldiers	"
<i>Amitermes sp. nov.</i>	1	Workers and soldiers	"
<i>Amitermes sp. nov.</i>	1	Workers and soldiers	"
<i>Tumulitermes sp. nov.</i>	3	Workers, soldiers and alates	Grass
<i>Tumulitermes sp. nov.</i>	1	Workers and soldiers	Grass
<i>Nasutitermes triodiae</i>	2	Workers and soldiers	Grass
<i>Nasutitermes sp. nov.</i>	2	Workers and soldiers	Grass
<i>Schedorhinotermes derosus</i>	1	Workers and soldiers	Grass
<i>Schedorhinotermes reticulatus</i>	1	Workers and soldiers	Wood
<i>Heterotermes paradoxus intermedius</i>	3	Workers and soldiers	Wood
<i>Heterotermes ferox</i>	1	Workers and soldiers	Wood
<i>Microcerotermes newmani</i>	2	Workers and soldiers	Wood
<i>Microcerotermes distinctus</i>	1	Workers and soldiers	Wood

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OBSERVATIONS ON THE HEAVY FRUITING OF QUANDONG TREES DURING THE DROUGHT YEAR OF 1969

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One morning early in October, 1969, a friend and I took a trip into the bush about 11 miles north of Merredin, in search of the "cancer plant", *Scaevola spinescens*, which grows in certain places in the district. After searching in the bush for a short time our attention was attracted to a group of Quandong trees, *Santalum acuminatum*, which were heavily in fruit. This is the usual fruiting period; the fruits usually ripen in October and the fruiting is finished by early November. What surprised us both, however, was to see the Quandong trees bearing so heavily. Neither of us had seen anything like it previously, and what added to our surprise was that the season had been extremely dry, a drought year.

We examined the trees, a group of about 15. The trees were nicely formed and none was old. All looked healthy.

A few days later I returned to this place again and gathered a 3lb. powdered milk tin full of Quandongs. The fruit was large and fleshy and nice tasting. Later, when I cleaned the Quandongs to make jam it was amazing to find the fruit was very clean and white inside and free from grubs or dirt. Out of the whole tin of fruit I had to discard only one Quandong which had been bruised slightly and blackened.

I wondered why this batch of fruit should be so clean as usually there are quite a lot of grubs and dirt in them. I thought at first that aerial spraying of crops, carried on in recent years in the neighbourhood, might have had some bearing on the absence of fruit-infesting grubs. However, in reply to an inquiry, Mr. R. D. Royce, Curator of the Western Australian Herbarium, states that entomologists are very sceptical about the control of these insects by aerial spraying. Furthermore most of the spray used would be weedicide; very little, if any, insecticide is applied from aeroplanes in the Merredin district.

In February, 1970, Cyclone Ingrid broke the distressingly long dry spell, which had begun when rains tapered off in the spring of 1968. Now flooding rains came and Merredin registered 350 points. A good season followed with additional unusually heavy flooding rains in late September, 1970. Merredin registered 215 points in a few days, with follow-up showers.

During October, 1970, my friends and I again made a trip into the bush to gather Quandong fruit. But the fruiting of the Quandong trees this season, throughout the district, was very erratic. Some trees during early October had fruited and all the fruit had fallen to the ground. Other trees were bearing, with fruit in varying stages of ripeness, some partly ripe, others large and still green. There were blossoms on some trees, as well as small green fruit forming. Throughout November ripe Quandongs were seen on trees until early December.